

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-20. (canceled)

21. (new) A waste water treatment plant including:

a treatment chamber containing a plurality of generally buoyant sludge carrier elements, and, in a lower part thereof a bio-film collection region for receiving in use bio-film from said sludge carrier elements;

an upper screen element at the upper end of said treatment chamber and a lower screen element separating the main part of the treatment chamber from the bio-film collection region, thereby to define, between said upper and lower screen elements, a containment volume within which said sludge carrier elements are confined;

an outlet for delivering waste water into an upper part of said treatment chamber;

a settlement chamber in flow communication at its lower end with said treatment chamber, whereby in use water may flow from said treatment chamber via said bio-film collection region to said settlement chamber;

a generally vertical column passing through said treatment chamber and having an upper end which projects above the liquid surface in use, and a lower region in flow communication with said treatment chamber below said lower screen element, and

air delivery means for introducing air or other gas into a lower region of said column in use to aerate the liquid therein and to cause the liquid to flow upwardly to overflow into said treatment chamber, thereby to circulate back down the treatment chamber,

whereby in use the flow from said column causes movement of said sludge carrier elements up and down said containment volume, with and against the flow of said liquid.

22. (new) The waste water treatment plant according to claim 21 wherein the air delivery means comprises a nozzle designed to create a large number of microbubbles which saturate the liquid with air and simultaneously force the sewage in the water to the surface.

23. (new) The waste water treatment plant according to claim 21, wherein the sludge carrier elements are made of plastics material.

24. (new) The waste water treatment plant according to claim 21, wherein the sludge carrier elements are of generally uniform size.

25. (new) The waste water treatment plant according to claim 24, wherein the sludge carrier elements are generally spherical with a central bore passing from one side to the other.

26. (new) The waste water treatment plant according to claim 25, wherein the inner and/or outer surfaces of the sludge carrier elements are textured or patterned to provide an extended surface area.

27. (new) The waste water treatment plant according to claim 26, wherein the inner and/or outer surfaces are corrugated to provide ribs or wings.

28. (new) The waste water treatment plant according to claim 21, wherein the settlement tank has an outlet for purified water towards its upper end.

29. (new) The waste water treatment plant according to claim 21, wherein the treatment chamber is generally cylindrical, and said vertical column is located co-axially within the treatment chamber.

30. (new) The waste water treatment plant according to claim 29, wherein the settlement chamber is of annular form encircling the treatment chamber.

31. (new) The waste water treatment plant according to claim 30, further comprising aeration means in the lower part of

the settlement chamber, with the settlement chamber being in flow communication at its lower end with a further settlement chamber.

32. (new) The waste water treatment plant according to claim 31, wherein the further settlement chamber is of annular form generally surrounding the first-mentioned settlement chamber.

33. (new) A waste water treatment plant including:  
a treatment chamber containing a plurality of sludge carrier elements and, in a lower part thereof, a bio-film collection region for receiving in use bio-film from said sludge carrier elements;

an outlet for delivering waste water into an upper part of said treatment chamber;

a settlement chamber in flow communication at its lower end with said treatment chamber, whereby in use water may flow from said treatment chamber via said bio-film collection region to said settlement chamber;

a generally vertical column passing through said treatment chamber and having an upper end which projects above the liquid surface in use, and a lower end in flow communication with said treatment chamber;

air delivery means for introducing air or other gas into a lower region of said column in use to aerate the liquid therein

and to cause the fluid to flow upwardly to flow into said treatment chamber, and

a further settlement chamber being in flow communication with the lower end of said first-mentioned settlement chamber.

34. (new) The waste water treatment plant according to claim 33, wherein the further settlement chamber is of annular form generally surrounding the first-mentioned settlement chamber.

35. (new) A waste water treatment plant including:

a generally cylindrical treatment chamber containing a plurality of sludge carrier elements and, in a lower part thereof, a bio-film collection region for receiving in use bio-film from said sludge carrier elements;

an outlet for delivering waste water into an upper part of said treatment chamber;

a first settlement chamber of annular form and generally surrounding the treatment chamber, and in flow communication at its lower end with said treatment chamber, whereby in use water may flow from said treatment chamber via said bio-film collection region to said first settlement chamber;

a generally vertical column disposed co-axially within said treatment chamber and having an upper end which projects above the liquid surface in use, and a lower end in flow communication with said treatment chamber;

air delivery means for introducing air or other gas into a lower region of said column in use to aerate the liquid therein and to cause the fluid to flow upwardly to flow into said treatment chamber;

aeration means provided in the lower part of the first settlement chamber; and

a further settlement chamber being in flow communication with the lower end of said first settlement chamber.

36. (new) The waste water treatment plant according to Claim 35, wherein the further settlement chamber is of annular form generally surrounding the first settlement chamber.

37. (new) The waste water treatment plant according to Claim 35, further comprising an upper screen element at the upper end of said treatment chamber and a lower screen element separating the main part of the treatment chamber from the bio-film collection region, thereby to define, between said upper and lower screen elements, a containment volume within which said sludge carrier elements are confined.

38. (new) The waste water treatment plant according to Claim 35, wherein the sludge carrier elements are generally buoyant and spherical with a central bore passing from one side to the other.

39. (new) The waste water treatment plant according to Claim 38, wherein the inner and/or outer surfaces of the sludge carrier elements are textured or patterned to provide an extended surface area.

40. (new) The waste water treatment plant according to Claim 39, wherein the inner and/or outer surfaces are corrugated to provide ribs or wings.